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## ABSTRACT

The automotive body sheet metal maintenance course is an exploratory course in the use of all sheet metal working and equipment common to this trade area. Included are techniques of diagnosis of damage and repair. Emphasized is the proper use of tools and fabrication methods used in automotive body maintenance and repair. This nine week course (135 clock hours) provides the learner with general information, technical knowledge, basic skills, attitudes and values that are required for entry level employment as an auto body repair and refinisher helper. Instruction will consist of demonstrations, lectures, group discussions, audiovisual aids and resource people from industry. A course outline is provided. The last 25 pages include four quinmester post tests. (DS)

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# AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

U.S. DEPARTMENT OF HEALTH,  
EDUCATION & WELFARE  
NATIONAL INSTITUTE OF  
EDUCATION

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Course Outline  
AUTOMOTIVE BODY REPAIR AND REFINISHING 1 - 9033  
(Automotive Body Sheet Metal Maintenance I)  
Department 48 - Quin 9033.05

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1973

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DADE COUNTY PUBLIC SCHOOLS  
1450 NORTHEAST SECOND AVENUE  
MIAMI, FLORIDA 33132

Course Outline

AUTOMOTIVE BODY REPAIR AND REFINISHING 1 - 9033  
(Automotive Body Sheet Metal Maintenance I)

Department 48 - Quin 9033.05

county office of  
VOCATIONAL AND ADULT EDUCATION

ED 092701

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Miami, Florida 33132

January, 1973

Published by the School Board of Dade County

# COURSE DESCRIPTION

| <u>9033</u>           | <u>48</u>           | <u>9033.05</u>           | <u>AUTOMOTIVE BODY SHEET METAL</u> |
|-----------------------|---------------------|--------------------------|------------------------------------|
| <u>State Category</u> | <u>County Dept.</u> | <u>County Course No.</u> | <u>MAINTENANCE I</u>               |
| <u>Number</u>         | <u>Number</u>       |                          | <u>Course Title</u>                |

This quinmester course is designed to explore the use of all sheet metal working and equipment common to this trade area. Diagnosis of damage and the proper techniques of repair are included. Emphasis is on the proper use of tools and fabrication methods used in automotive body maintenance and repair.

The student will receive the general information, technical knowledge, basic skills, attitudes and values that are required for job entry level as an auto body repair and refinisher helper. This course will be given in a nine-week period.

Indicators of success: The applicant must demonstrate an eighth grade equivalency score in reading and mathematics. Also have average ability in mechanical aptitudes.

Clock Hours: 90

## PREFACE

The following quinmester course outline is a guide to help students become employable with skills, knowledge, attitudes and values necessary for performing the required service of the automotive body repair trainee.

This course is designed as a foundation quinmester course for the auto body repair trainee. This outline consists of six blocks of instruction which are subdivided into several units each. It is only one part of a series of quinmester outlines designed for the complete auto body repair trainee. This course is 90 hours in length.

Prerequisites for this course is as follows: The student should have an eighth grade equivalency score in reading, comprehension, arithmetic fundamentals and mechanical aptitude. The student must be physically and mentally able to profit from this training.

Prior to entry into this course, the vocational student will display mastery of the skills indicated in Auto Body Welding II (9033.04).

Instruction will consist of demonstrations, lectures, group discussions, audio visual aids and resource people from industry. Instruction will be flexible to meet individual needs and abilities.

The bibliography appearing on the last page of this outline lists several basic references also supplementary references and audio visual aids.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee and the Vocational Curriculum Materials Service and has been approved by the Dade County Vocational Curriculum Committee.

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with Suggested Hourly Breakdown

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| Student Benefits . . . . .                           | 1    |
| Student Responsibilities . . . . .                   | 1    |
| II. SERVICE TOOLS AND BENCH SKILLS (8 Hours)         |      |
| Automotive Hand Tools . . . . .                      | 1    |
| Measuring Devices . . . . .                          | 2    |
| III. AUTOMOTIVE BODY SHEET METAL (10 Hours)          |      |
| Properties of Sheet Metal . . . . .                  | 2    |
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## GOALS

The auto body repair trainee must be able to:

1. Demonstrate an understanding of the objectives of the course.
2. Demonstrate an understanding of the service tools and bench skills.
3. Demonstrate an understanding of the properties, construction, sizes, and damages of automotive sheet metal.
4. Demonstrate an understanding of auto body repair tools and equipment.
5. Demonstrate an understanding of the types of automotive sheet metal maintenance tools.
6. Demonstrate an understanding of the techniques and operations of straightening and alignment of automotive sheet metal.
7. Satisfactorily complete the post test.

## SPECIFIC BLOCK OBJECTIVES

### BLOCK I - ORIENTATION

The student must be able to:

1. List the opportunities that are available for career in auto body and refinishing occupational field by written assignment.
2. Explain what will be expected of him as an auto body repair trainee by oral assignment.
3. Demonstrate skills and knowledge which will prepare him for a safe working life by actual shop practice.
4. Demonstrate pride and respect for workmanship by his performance.
5. Demonstrate an understanding and acceptance of personal responsibilities by his performance in the shop.
6. Explain the student benefits by oral assignment.

### BLOCK II - SERVICE TOOLS AND BENCH SKILLS

The student must be able to:

1. Define the general type tools and their use by written assignment.
2. Exhibit the ability to use the applicable tools and perform bench skills in the proper manner by selection and use.
3. Demonstrate the proper care and maintenance of tools and equipment by performance in the shop.
4. Exhibit the ability to observe safety precautions in the use of tools and equipment by performance in the shop.
5. Exhibit the ability to identify power tools and equipment by study of textbooks.
6. Demonstrate the ability to perform maintenance and repairs to power tools by performance in the shop.
7. Exhibit the ability to practice safety precautions by observing safety rules.
8. Demonstrate the ability to use measuring devices by performance in the shop.

### BLOCK III - AUTOMOTIVE BODY SHEET METAL

The student must be able to:

1. Explain the different properties of auto sheet metal by oral assignment.
2. Demonstrate an understanding of the types of tests used for testing auto body sheet metal by oral assignment.
3. List the types of materials used in auto body sheet metal by written assignment.
4. Demonstrate an understanding of the manufacturing methods of auto body sheet metal by oral assignment.
5. List the basic shapes and reinforcements used in the auto body sheet metal by written assignment.
6. Explain the basic damage conditions of auto body sheet metal by oral assignment.
7. Demonstrate the ability to identify types of sheet metal damage by observation and oral assignment.

8. Determine extent of related damage to sheet metal by oral assignment.
9. Explain the effect of the size, weight and rigidity of the impact object has on auto body sheet metal by oral assignment.

#### BLOCK IV - SHEET METAL MAINTENANCE TOOLS

The student must be able to:

1. List the hand tools used in the repair of auto body sheet metal by written assignment.
2. Exhibit the ability to properly use the hammer, dolly, spoon and body file by performance in the shop.
3. Explain the safety precautions when using the basic tools for automobile body sheet metal repairs by oral assignment.
4. Demonstrate an understanding of the power tools used in the repair of automobile sheet metal by oral assignment.
5. Exhibit the ability to properly use the power tools in the shop by performance in the shop.
6. Exhibit the ability to properly use the shop equipment by performance in the shop.

#### BLOCK V - SHEET METAL STRAIGHTENING AND ALIGNING

The student must be able to:

1. Explain the methods of analyzing damage by written assignment.
2. Demonstrate the manner in which sense of touch and visual inspection are used for diagnosis by oral assignment.
3. Demonstrate an understanding of diagnosing sheet metal damage by oral assignment.
4. Exhibit the ability to perform the basic sheet metal straightening operations by performance in the shop.
5. Demonstrate the ability to properly use the basic hand tools and power tools in sheet metal repair by performance in the shop.
6. Demonstrate an understanding of basic sheet metal aligning operations by oral assignment.
7. Exhibit the ability to properly use heat and force to align sheet metal by performance in the shop.

#### BLOCK VI - QUINMESTER POST TEST

The student must be able to:

1. Satisfactorily complete the quinmester post-test.

## Course Outline

### AUTOMOTIVE BODY REPAIR AND REFINISHING 1 - 9033 (Automotive Body Sheet Metal Maintenance I)

Department 48 - Quin 9033.05

#### I. ORIENTATION

- A. Objectives of Course
  - 1. Standards
  - 2. Methods of evaluation
    - a. Oral test
    - b. Written Test
    - c. Manipulation
    - d. Diagnosis and job performance
  - 3. Teaching methods
- B. Student Benefits
  - 1. Opportunities for employment
    - a. Job opportunities
    - b. Scope of trade
  - 2. Qualifications for employment
    - a. Job competency
    - b. Attitude
    - c. Dependability
    - d. Pride of workmanship
    - e. Experience
    - f. Trade certificate
    - g. Foundation for more education and training
- C. Student Responsibilities
  - 1. Safety regulations
  - 2. School policies and expenses
  - 3. Shop rules and procedures
    - a. Use and care of equipment
    - b. Care of hand tools
    - c. Appropriate dress
    - d. Reporting loss of equipment
    - e. Housekeeping
    - f. Reporting defective equipment
    - g. Materials and supplies
    - h. Employer-employee relations
    - i. Employee-customer relations

#### II. SERVICE TOOLS AND BENCH SKILLS

- A. Automotive Hand Tools
  - 1. Types and sizes
  - 2. Uses and safety practices
    - a. Assembly
    - b. Disassembly
    - c. Hammering
    - d. Sawing

## II. SERVICE TOOLS AND BENCH SKILLS (Contd.)

- e. Drilling
- f. Tapping
- g. Adjusting
- h. Power tools
- i. Vises and clamps
- j. Straightening devices
- k. Soldering

### B. Measuring Devices

- 1. Steel tape
- 2. Tram gauge
- 3. Center line gauge
  - a. Numerical measurements
  - b. Comparative measurements

## III. AUTOMOTIVE BODY SHEET METAL

### A. Properties of Sheet Metal

- 1. Tensile strength
  - a. Unit of tensile strength
  - b. Technique of performing a tensile strength test
  - c. Meaning of yield strength
- 2. Ductility
  - a. Definition of the term
  - b. Measurement of ductility
- 3. Work hardening
  - a. Relationship of work hardened to ductility
  - b. Definition of work hardening
- 4. Stress and strain
  - a. Definition of stress
  - b. Definition of strain
  - c. The four stresses
    - (1) Tension
    - (2) Compression
    - (3) Shear
    - (4) Torsion
- 5. Elasticity
  - a. The measure of elasticity
  - b. Elasticity of a useful property of metal
- 6. Compression strength of metal
- 7. Fatigue strength defined
- 8. Toughness as a metallic property
- 9. Hardness
  - a. What it is
  - b. Hardness tests
    - (1) The rockwell test
    - (2) The brinell test
    - (3) The sileroscope test
    - (4) Other hardness tests

### III. AUTOMOTIVE BODY SHEET METAL (Contd.)

- 10. Corrosion resistance
  - a. What it is
  - b. Uses for corrosion resistant steel
- 11. Weldability
  - a. Definition of the term
  - b. Factors affecting weldability
- B. Sheet Metal Construction
  - 1. Materials
    - a. Steel
    - b. Aluminum
    - c. Alloys
  - 2. Manufacturing methods
    - a. Pressed
    - b. Drawn
    - c. Stamped
    - d. Molded
  - 3. Basic shapes
    - a. Surface contours
    - b. Crowns
      - (1) High
      - (2) Low
      - (3) High and low combination
      - (4) Reverse
  - 4. Basic reinforcements
    - a. Stiffeners to prevent vibration or flexing
      - (1) Flanges
      - (2) Beads
      - (3) Offsets
      - (4) Angles
    - b. Structural members
      - (1) Channel construction
      - (2) Box construction
- C. Sheet Metal Damage
  - 1. Basic damage conditions
    - a. Displaced areas
    - b. Simple bends
    - c. Rolled buckles
    - d. Upsets
    - e. Stretches
    - f. Tears or rips
    - g. Broken welds
  - 2. Related sheet metal damage
    - a. Impact angle
      - (1) Direct impact
      - (2) Glancing impact
    - b. Speed of impact object
      - (1) Stationary object
      - (2) Moving object

### III. AUTOMOTIVE BODY SHEET METAL (Contd.)

- c. Objects moving toward each other
- d. Size, rigidity and weight
  - (1) Large object
  - (2) Small object
  - (3) Rigid object
  - (4) Yielding object
  - (5) Heavy object
  - (6) Light object

### IV. SHEET METAL MAINTENANCE TOOLS

#### A. Sheet Metal Repair Hand Tools

- 1. Body hammer
  - a. Types
  - b. Shapes
  - c. Construction
    - (1) Weight
    - (2) Balance
  - d. Techniques of use
  - e. Care
- 2. Dollies
  - a. Types
  - b. Shapes
  - c. Construction
    - (1) Weight
    - (2) Balance
  - d. Techniques of use
  - e. Care
  - f. Safety precautions
- 3. Body spoons and body picks
  - a. Types
  - b. Shapes
  - c. Uses
  - d. Construction
    - (1) Weight
    - (2) Balance
  - e. Techniques of use
  - f. Care
  - g. Safety
- 4. Body files
  - a. Types
  - b. Uses
  - c. Techniques of use
  - d. Care
  - e. Safety precautions

#### B. Sheet Metal Repair Power Tools

- 1. Portable electric disc sander
  - a. Types
  - b. Uses
  - c. Sanding disc

#### IV. SHEET METAL MAINTENANCE TOOLS (Contd.)

- (1) Types
    - (2) Sizes
    - (3) Uses
    - (4) Composition
    - (5) Abrasive grits
  - 2. Orbital air sander
    - a. Types
    - b. Sizes
    - c. Uses
    - d. Care
    - e. Safety precautions
- C. Shop Equipment
- 1. Oxyacetylene welding equipment
    - a. Welding
    - b. Heating
    - c. Cutting
    - d. Safety precautions
  - 2. Body jacks
    - a. Types
    - b. Sizes
    - c. Uses
    - d. Safety precautions

#### V. SHEET METAL STRAIGHTENING AND ALIGNING

- A. Diagnosing Sheet Metal Damage
- 1. Visual inspection
  - 2. Sense of touch
  - 3. Comparative measurements
  - 4. Techniques of determining
    - a. Point of impact
    - b. Force of impact
    - c. Direction of impact
    - d. Extent of damage
    - e. Strains and upsets
    - f. Related damage
    - g. Types of damage
  - 5. Sequence of operation in aligning
- B. Basic Sheet Metal Straightening Operations
- 1. Hammer and dolly techniques
    - a. Hammer on dolly
    - b. Hammer off dolly
    - c. Hammer alone
    - d. Dolly alone
  - 2. Body spoon techniques
    - a. Uses as a pry bar
    - b. Use as a dolly
    - c. Spoon and hammer
    - d. Spoon alone

## V. SHEET METAL STRAIGHTENING AND ALIGNING (Contd.)

3. Pick hammer technique
    - a. Pointed end for small dents
    - b. Large head for larger dents
  4. Body pick tools techniques
    - a. Lever-type tool
    - b. Push out small dents
    - c. Inaccessible areas
  5. Body files techniques
    - a. Nonadjustable
    - b. Adjustable
    - c. Light pressure on work
    - d. Long and regular strokes
    - e. Locates low spots
  6. Portable electric sander techniques
    - a. Hold firmly
    - b. Back and forth motion
    - c. Remove paint
    - d. Locates low spots in metal
    - e. Wear safety goggles
  7. Orbital air sander technique
    - a. Electric or air
    - b. Removes scratches
    - c. Featheredging
    - d. Slight pressure on work
    - e. Wet or dry sanding
    - f. Wear respirator
    - g. Safety precautions
  8. Oxyacetylene welding techniques
    - a. Welding
    - b. Heating
    - c. Cutting
    - d. Quenching
    - e. Shrinking
    - f. Hammer and dolly
    - g. Safety precautions
- C. Basic Sheet Metal Aligning Operations
1. Factors involved in displacing metal
    - a. Force
    - b. Size of impact area
    - c. Amount of upset
    - d. Types of tools and equipment required
    - e. Methods of maintaining alignment during the unrolling and unlocking operation
    - f. Methods of the removal of stresses and strains
  2. Techniques of normalizing by use of heat
    - a. Purpose
    - b. Effects on metal
    - c. Stresses developed
    - d. Strain patterns developed
    - e. Methods of using heat to maintain alignment of sheet metal

## V. SHEET METAL STRAIGHTENING AND ALIGNING (Contd.)

### 3. Techniques of using a force during normalizing operations

#### a. Types

- (1) Hydraulic jacks
- (2) Manual operated jacks
- (3) Cable jacks
- (4) Power pullers
- (5) Come-along
- (6) Turn buckles

#### b. Methods of using heat and a force to maintain alignment of sheet metal

#### c. Methods of using heat and a force to maintain alignment of inner structure or reinforcement braces

## VI. QUINMESTER POST-TEST

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(Automotive Body Sheet Metal Maintenance I)

Basic References:

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2. Sargent, L. Robert. Automotive Sheet Metal Repair, Phila: Chilton Co., 1963. Pp. 423.
3. Study Guide to Automotive Collision Work. Revised Edition, Chicago: American Technical Society, 1956. Pp. 67.

Supplementary References:

4. General Repair Tools. Albany: Delmar Publishers, Inc., 1963. Pp. 181.
5. Pennsylvania State University. William A. Williams, Editor. Accident Prevention Manual for Shop Teachers. Chicago: American Technical Society, 1963. Pp. 550.
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9. Wohlfield, T., and Others. Automobile Body Reconditioning. New York: McGraw-Hill Book Co., Inc., 1952. Pp. 157.

Films:

- |                                                                                        | Dade County<br>Number |
|----------------------------------------------------------------------------------------|-----------------------|
| 1. <u>ABC of Hand Tools, Part I</u> . 16 mm. 18 min. Color. Sound.<br>General Motors.  | 1-11397               |
| 2. <u>ABC Of Hand Tools, Part II</u> . 16 mm. 16 min. Color. Sound.<br>General Motors. | 1-11397               |
| 3. <u>Accidents Happen to Sam</u> . 16 mm. 13 min. B/W. Sound.<br>National Safety.     | 1-11339               |
| 4. <u>Hammers</u> . 16 mm. 11 min. B/W. Sound. 1943. United<br>World Films.            | 515                   |

Films (Contd.)

5. I Want A Job. 16 mm. 26 min. B/W. Sound. Ford Motor Co. 1-11568
6. Know Your Car. 16 mm. 15 min. B/W. Sound. 1945. Unit 993  
World Films, Inc.
7. Pliers & Screwdrivers. 16 mm. 18 min. B/W. Sound. 525  
1943. United World Films, Inc.
8. Punches, Drfits and Bars. 16 mm. 14 min. B/W. Sound. 527  
1943. United World Films, Inc.

**A P P E N D I X**

**QUINMESTER POST-TEST SAMPLE**

QUINTESTER POST-TEST #1

NAME \_\_\_\_\_ DATE \_\_\_\_\_ SCORE \_\_\_\_\_

The following items are multiple choice. Select the one you believe correct. Circle the letter provided at left of item.

1. Because of common usage, sheet steel is called
  - a. iron
  - b. sheet metal
  - c. fiberglass
  - d. none of the above
2. Sheet metal that is stamped into shape must be relatively
  - a. hard
  - b. stretched
  - c. soft
  - d. burned
3. Sheet metal means
  - a. iron
  - b. brass
  - c. sheet steel
  - d. Fiberglass
4. When enough force has been applied to cause deformation to sheet metal, it has reached the
  - a. yield point
  - b. elasticity point
  - c. draw die point
  - d. crown point
5. Many of the inner panels show patterns of wavy lines on the surface. These are called
  - a. work hardening
  - b. bending
  - c. annealing
  - d. stretcher strains
6. Result of deformation under tension is called
  - a. contracting
  - b. stretching
  - c. quenching
  - d. burning

7. Sheet metal melts at about
- a.  $100^{\circ}\text{F}$
  - b.  $6000^{\circ}\text{F}$
  - c.  $2600^{\circ}\text{F}$
  - d.  $32^{\circ}\text{F}$
8. Upsetting is the result of deformation under
- a. pressure
  - b. quenching
  - c. tension
  - d. none of the above
9. Changing the shape of a sheet of metal may be called
- a. cold working
  - b. plastic deformation
  - c. quenching
  - d. all of the above
10. Cast iron has no plasticity because it is
- a. hollow
  - b. sheet metal
  - c. soft
  - d. rigid
11. Automobile panels are formed in a
- a. lathe
  - b. band saw
  - c. burner
  - d. draw die
12. Metal undergoes a change of grain structure when heated to
- a.  $1600^{\circ}\text{F}$
  - b.  $100^{\circ}\text{F}$
  - c.  $32^{\circ}\text{F}$
  - d. none of the above
13. Immersing hot steel in water is called
- a. stretching
  - b. bending
  - c. quenching
  - d. burning

14. Raising the temperature of metal causes it to
- a. shrink
  - b. expand
  - c. freeze
  - d. contract
15. Lowering the temperature of metal causes it to
- a. stretch
  - b. expand
  - c. melt
  - d. contract
16. Basic classifications used to describe the crown of any panel are
- a. high, low, reverse, middle
  - b. high, low, reverse
  - c. high, low, reverse, high and low
  - d. high, low, high and low
17. The center area of the roof panel is an example of a
- a. low crown
  - b. high crown
  - c. reverse crown
  - d. none of the above
18. The strongest type of crown of any panel is
- a. low
  - b. high
  - c. reverse
  - d. none of the above
19. Basic types of reinforcements include those
- a. welded to a panel, welded to a wheel, and formed in the surface of an inner or outer panel
  - b. Welded to a panel and formed in the surface of an inner or outer panel
  - c. formed in the surface of an inner or outer panel
  - d. welded to a panel or welded to a wheel
20. The strongest type of reinforcement is
- a. box
  - b. flange
  - c. channel
  - d. none of the above

21. The metalman's work in repairing collision damage is primarily
- a. drilling holes in metal
  - b. undoing the effect of an impact force
  - c. sanding an automobile
  - d. changing tires
22. The point or area where the object struck and damaged any panel is called the
- a. simple bends
  - b. rolled buckles
  - c. impact area
  - d. none of the above
23. One or both of the surface dimensions of the affected area will be reduced by
- a. an upset
  - b. a sanding
  - c. a simple bend
  - d. a rolled buckle
24. When opposing forces push against an area of the metal and cause it to yield, it is called
- a. a simple bend
  - b. an upset
  - c. a fusion
  - d. a rolled buckle
25. When an upset has caused an adjoining area to bulge so that it appears to be stretched, it is called
- a. a simple bend
  - b. a rolled buckle
  - c. an impact area
  - d. a false stretch

QUINMESTER POST-TEST #2

NAME \_\_\_\_\_ DATE \_\_\_\_\_ SCORE \_\_\_\_\_

The following items are multiple choice. Select the one you believe correct. Circle the letter provided at left of item.

1. The most common types of dolly blocks are
  - a. general purpose
  - b. heel
  - c. toe
  - d. all of the above
2. The dolly block normally is used on the
  - a. underside or inside of the panel
  - b. outside the panel
  - c. primed panel
  - d. none of the above
3. Dollies are used either as a striking tool or as a back-up tool for the
  - a. chisel
  - b. rubber hammer
  - c. bumping hammer
  - d. pliers
4. The most frequently used dolly is the
  - a. general purpose
  - b. heel
  - c. toe
  - d. none of the above
5. The heel dolly and the toe dolly are used in narrow quarters where the
  - a. panel is unobstructed
  - b. larger general purpose dolly cannot enter
  - c. bumping hammer will enter
  - d. larger general purpose dolly can enter
6. The dolly blocks are used to make right angle edges, flanges and sharp bands, are the
  - a. heel dolly and general purpose dolly
  - b. toe dolly and dolly spoon
  - c. heel dolly and toe dolly
  - d. toe dolly and general purpose dolly

7. The primary purpose of the dolly is to provide a reaction to the force of a
  - a. portable grinder
  - b. hammer blow
  - c. porto-power jack
  - d. none of the above
8. Using a dolly with the right crown on the working face will result in
  - a. slower work
  - b. slower and better work
  - c. rougher work
  - d. faster and better work
9. Weight and balance must be considered in selecting a
  - a. portable welder
  - b. floor jack
  - c. dolly block
  - d. none of the above
10. The weight of the dolly block should be three times the weight of the
  - a. panel
  - b. pry rod
  - c. bumping hammer
  - d. none of the above
11. The bumping hammer and dolly block are the metalman's most important tools for
  - a. welding a panel
  - b. bending a panel
  - c. straightening metal
  - d. straightening a frame
12. The dolly block is used and without the
  - a. pliers
  - b. hammer
  - c. hacksaw
  - d. none of the above
13. The dolly block is an excellent tool for striking the inner surface to
  - a. rough out simple dents
  - b. metal finish a panel
  - c. align a panel
  - d. remove the paint

14. An efficient means of smoothing the roughed-out surface is with a
- a. porto-power jack
  - b. hammer and dolly
  - c. dolly
  - d. hammer
15. When the dolly is held directly under the spot struck by the hammer, it is called a
- a. hammer-off dolly
  - b. hammer-on dolly
  - c. hammer-off panel
  - d. hammer-off body spoon
16. When the dolly is held to one side under the spot struck by the hammer face, it is called a
- a. hammer-off dolly
  - b. hammer-on dolly
  - c. hammer-off panel
  - d. hammer-on panel
17. The type of hammer that should be used when practicing to hit the dolly are
- a. hard blows
  - b. light to medium blows
  - c. follow-through blows
  - d. all of the above
18. The bumping hammer should be held
- a. firmly
  - b. lightly
  - c. tightl,
  - d. none of the above
19. The effect of a hammer-on dolly tends to increase the area of the spot and to
- a. raise it above the level of the surrounding metal
  - b. lower it below the surrounding metal
  - c. shrink the metal
  - d. put holes in the metal
20. The action of the hammer and the dolly in the on-dolly operation is concentrated on
- a. a very small spot of metal
  - b. a very large spot of metal
  - c. a painted panel
  - d. none of the metal

21. The metalman's hand tools are primarily used for
- a. welding metal
  - b. removing metal
  - c. straightening metal or metal finishing
  - d. cutting metal
22. The basic metal straightening tools are
- a. bumping hammer, dolly and spoon
  - b. bumping hammer and screwdriver
  - c. pliers and screwdriver
  - d. bumping hammer and pliers
23. The general purpose bumping hammer is sometimes called a
- a. sledge hammer
  - b. pick hammer
  - c. cutting hammer
  - d. dinging hammer
24. A bumping hammer with a large head on one end and a pick on the other end is called a
- a. spoon hammer
  - b. sledge hammer
  - c. tack hammer
  - d. combination hammer
25. The most widely used type of hammer is the
- a. sledge hammer
  - b. ball pein hammer
  - c. combination hammer
  - d. spoon hammer

QUINMESTER POST TEST #3

NAME \_\_\_\_\_ DATE \_\_\_\_\_ SCORE \_\_\_\_\_

The following items are multiple choice. Select the one you believe correct. Circle the letter provided at the left of the item.

1. The two basic steps of a straightening operation are
  - a. welding and roughing
  - b. roughing and bumping
  - c. bumping and shrinking
  - d. roughing and breaking
2. The most critical step of the straightening operation is
  - a. shrinking
  - b. welding
  - c. bumping
  - d. roughing
3. Restoring the final surface smoothness to damaged panels after the straightening operations is called
  - a. metal finishing
  - b. rough finish
  - c. sanding
  - d. none of the above
4. Metal finishing serves as a means of locating the
  - a. welded areas in the metal panel
  - b. low areas in the metal surface
  - c. painted areas in the outer panel
  - d. holes in the metal panel
5. The low areas in the panel are lifted up by means of a
  - a. floor jack
  - b. bumping spoon
  - c. pick hammer
  - d. sledge hammer
6. The basic cutting tools used in metal finishing are the
  - a. 14" body file and the disc sander
  - b. disc sander and the sledge hammer
  - c. 14" body file and the slide hammer
  - d. 14" body file and the rubber hammer

7. The variable factor that must be controlled to obtain desired results when using the hammer-on dolly is
  - a. the force of the hammer blow
  - b. the crown of the working surface of the dolly block in contact with the underside of the panel
  - c. the amount of hand pressure applied to the dolly block
  - d. all of the above
8. The result of using the hammer-on dolly too much is
  - a. overstretching
  - b. quenching
  - c. contracting
  - d. brazing
9. A hammer blow should never be struck except on metal which has been raised above the proper level when
  - a. using the hammer-on dolly
  - b. using the hammer and pliers
  - c. using the hammer-off dolly
  - d. none of the above
10. When using a hammer-off dolly, the first hammer blows should fall on the high metal farthest from the dent, and the following blows should work
  - a. outward progressively
  - b. inward progressively
  - c. from the center to the outside
  - d. on the underside of the panel
11. When working off-dolly the force of the hammer blow must be limited just enough to
  - a. make the hammer bounce
  - b. drive the high spot down to level
  - c. drive the metal into a high spot
  - d. drive the high spot below level
12. A body spoon is never used for repairing any panel in which a dolly block
  - a. does not have free access to the inner surface of a panel
  - b. has free access to the inner surface of a panel
  - c. will not fit the crown of the panel
  - d. none of the above
13. Used with the bumping hammer, the body spoon serves the same purpose as the
  - a. slide hammer
  - b. porto-power jack
  - c. dolly block
  - d. sledge hammer

14. With a good set of body spoons, the metalman can repair panels
  - a. by not cutting out the inner panel and welding back the inner panel
  - b. by cutting out the inner panel and welding back the inner panel
  - c. by cutting out the outer panel and welding the outer panel in place
  - d. by welding the spoon to the outer or inner panel
15. The body spoon may be used to
  - a. remove the headlight
  - b. straighten a wheel
  - c. replace a fender
  - d. pry out low metal
16. One factor affecting the effectiveness of the body spoon as a substitute for a dolly block is
  - a. stretching
  - b. balance
  - c. impact point
  - d. yield point
17. The choice of a body spoon is governed by the condition of the
  - a. panel to be repaired
  - b. whole automobile
  - c. tires
  - d. bumping hammer
18. The purpose of using the body file is to remove minor surface irregularities and
  - a. straighten the inner panel
  - b. cut the low spots in the panel
  - c. show up larger surface irregularities
  - d. none of the above
19. To use the body file efficiently, it is necessary to consider
  - a. the direction of the file stroke and the side shift during the file stroke
  - b. the weight of the panel and the weight of the body file
  - c. the weight of the panel and the weight of the disc sander
  - d. the direction of the file stroke and the weight of the panel
20. The file should be stroked in the general direction of the
  - a. inner panel
  - b. flattest crown of the panel
  - c. highest crown of the panel
  - d. reverse crown of the panel

21. The shift of the file during the stroke is important because it
- a. cuts a single and narrow strip of metal
  - b. does not cut any of the metal
  - c. straightens the inner panels
  - d. determines the area covered by the file
22. The first shift of the body file is to make the contact area of the teeth move from
- a. the left side of the right side during the backward stroke
  - b. the front to the rear end of the file during the forward stroke
  - c. the front to the side during the backward stroke
  - d. none of the above
23. The second shift of the body file is a side-slipping action which causes the file to finish the stroke
- a. a few inches to one side of the line on which it was started
  - b. in a long, narrow cutting action
  - c. in a short, rapid, choppy stroke
  - d. all of the above
24. The portable disc sander commonly used in sheet metal repair is
- a. an electric unit operating on 110 volt, 30 amp power supply
  - b. an electric unit operating on 12 volt supply
  - c. operated manually
  - d. gas operated

QUINMESTER POST-TEST #4

NAME \_\_\_\_\_ DATE \_\_\_\_\_ SCORE \_\_\_\_\_

The following items are multiple choice. Select the one you believe correct. Circle the letter provided at the left of the item.

1. The portable disc sander commonly used in sheet metal repair is
  - a. an electric unit operating on 110 volt, 30 amp power supply
  - b. an electric unit operating on 12 volt supply
  - c. operated manually
  - d. gas operated
2. The handle at the spindle end of the portable disc sander may be
  - a. bent into any shape
  - b. welded into one place
  - c. mounted on either side
  - d. all of the above
3. An important factor in the life of a disc sander is
  - a. proper care
  - b. proper handling
  - c. proper cleaning
  - d. all of the above
4. The portable electric disc sander should
  - a. be picked up by the cord
  - b. not be pickd up by the cord
  - c. not be picked up by the handle
  - d. be picked up by the disc
5. If the backup pad on the disc sander is warped, it will
  - a. operated smoothly
  - b. cause a vibration
  - c. not operate
  - d. cause overheating
6. Probably the most common cause of serious damage to the disc sander motor is
  - a. overcooling
  - b. warping of the backup pad
  - c. overheating
  - d. none of the above

7. The most common cause of overheating of the disc sander motor is
- a. clogging of the motor ventilating system
  - b. vibration of the backup pad
  - c. a broken electric cord
  - d. an improper disc being used
8. The solution to overheating of the disc sander is periodic
- a. painting of the disc sander
  - b. oiling of the disc sander
  - c. changing of the discs
  - d. cleaning of the disc sander
9. A third wire is provided in the cord of all portable electric tools so that
- a. it is easy to pick up the electric tool
  - b. the case can be connected to the ground circuit
  - c. the cord will be stronger
  - d. none of the above
10. Operating an undergrounded portable electric tool can result in
- a. severe electric shock
  - b. death
  - c. injuries
  - d. all of the above
11. Sanding discs used in sheet metal repair work consist of
- a. a soft paper disc coated on both sides with abrasive grit
  - b. a stiff fiber disc coated on one side with abrasive grit
  - c. a metal disc coated on both sides with abrasive grit
  - d. a stiff fiber disc without any abrasive grit
12. The grit used almost universally is
- a. copper oxide
  - b. mercury
  - c. aluminum oxide
  - d. iron oxide
13. The grit is bonded to the fiber disc by
- a. glue or tape
  - b. resin or tape
  - c. glue or resin
  - d. none of the above

14. The resin-bonded discs are more expensive but they are
- a. much more durable than the glue-bonded discs
  - b. less durable than the glue-bonded discs
  - c. as durable as the glue-bonded discs
  - d. none of the above
15. Grit sizes are identified by
- a. weight
  - b. length
  - c. number
  - d. height
16. The common sizes of a sanding disc are
- a. 5 and 6 inches in diameter
  - b. 9 and 11 inches in diameter
  - c. 7 and  $9\frac{1}{4}$  inches in diameter
  - d. 8 and 10 inches in diameter
17. Sanding discs of smaller diameter are usually obtained by
- a. cutting a larger disc down to the size needed
  - b. ordering the special discs from the manufacturer
  - c. both a and b
  - d. none of the above
18. The center hole of a sanding disc usually is
- a.  $\frac{7}{8}$  inch or  $\frac{1}{2}$  inch in diameter
  - b.  $\frac{5}{8}$  inch or  $\frac{1}{2}$  inch in diameter
  - c.  $\frac{7}{8}$  inch or  $\frac{1}{4}$  inch in diameter
  - d.  $\frac{5}{8}$  inch or  $\frac{1}{4}$  inch in diameter
19. Number 16 grit size is a larger abrasive than
- a. number 24
  - b. number 36
  - c. number 50
  - d. all of the above
20. Grit sizes and numbers of abrasive materials mean
- a. the larger the number, the larger the grit size
  - b. the larger the number, the smaller the grit size
  - c. the number is the same as the grit size
  - d. none of the above

21. Glue-bonded discs are made in
- a. open coat or cloth coat disc
  - b. open coat or closed coat disc
  - c. closed coat or paper coat disc
  - d. none of the above
22. A disc that has the grit applied in light layers so that the fiber backing shows through is called
- a. cloth coat disc
  - b. a closed coat disc
  - c. an open coat disc
  - d. a paper coat disc
23. The type of disc used primarily for removal of paint is called
- a. an open coat disc
  - b. a cloth coat disc
  - c. a paper coat disc
  - d. a closed coat disc
24. A disc that has the grit applied in a heavy layer so that it will stand up under heavy-duty conditions is called
- a. a cloth coat disc
  - b. a paper coat disc
  - c. a closed coat disc
  - d. an open coat disc
25. Resin-bonded discs are made in
- a. six types of coats
  - b. four types of coats
  - c. five types of coats
  - d. only one type of coat

# QUINMESTER POST TEST ANSWER SHEET

| <u>TEST #1</u> | <u>TEST #2</u> | <u>TEST #3</u> | <u>TEST #4</u> |
|----------------|----------------|----------------|----------------|
| 1. B           | 1. D           | 1. B           | 1. A           |
| 2. C           | 2. A           | 2. D           | 2. C           |
| 3. C           | 3. C           | 3. A           | 3. D           |
| 4. A           | 4. A           | 4. B           | 4. B           |
| 5. D           | 5. B           | 5. C           | 5. B           |
| 6. B           | 6. C           | 6. A           | 6. C           |
| 7. C           | 7. B           | 7. D           | 7. A           |
| 8. A           | 8. D           | 8. A           | 8. D           |
| 9. A           | 9. C           | 9. C           | 9. B           |
| 10. D          | 10. C          | 10. B          | 10. D          |
| 11. D          | 11. C          | 11. B          | 11. B          |
| 12. A          | 12. B          | 12. B          | 12. C          |
| 13. C          | 13. A          | 13. C          | 13. C          |
| 14. B          | 14. B          | 14. A          | 14. A          |
| 15. D          | 15. B          | 15. D          | 15. C          |
| 16. C          | 16. A          | 16. B          | 16. C          |
| 17. A          | 17. B          | 17. A          | 17. C          |
| 18. C          | 18. B          | 18. C          | 18. A          |
| 19. B          | 19. A          | 19. A          | 19. D          |
| 20. A          | 20. A          | 20. B          | 20. B          |
| 21. B          | 21. C          | 21. D          | 21. B          |
| 22. C          | 22. A          | 22. B          | 22. C          |
| 23. A          | 23. D          | 23. A          | 23. A          |
| 24. B          | 24. D          | 24. A          | 24. C          |
| 25. D          | 25. C          |                | 25. D          |